

HJR 153 FEASIBILITY STUDY

GENERIC QUESTIONS

It should be noted that the North Carolina Public Staff Utilities Commission ("Public" Staff) presented a report in November 2003 to the North Carolina Disaster Preparedness Task Force titled "Feasibility of Placing Electric Distribution Facilities Underground". The report is included as part of our response for your review.

The research and analysis conducted by the Public Staff in North Carolina is in depth and thorough. Their report covers the following items:

- 1) A comparison of operational advantages and disadvantages of overhead and underground power distribution systems.
- 2) Estimates and comparisons of capital costs of converting overhead lines to underground, including analysis of the difference in operation and maintenance costs for the two types of systems.
- 3) Estimates of time and human resources required to bury underground lines.
- 4) Identification of potential additional costs to customers, municipalities, and other utilities that may result from conversion.
- 5) Exploration of options for financing conversion projects.

The Public Staff, upon reviewing the results of the above outlined analysis, determined that replacing existing overhead distribution lines with underground lines would be prohibitively expensive. Indeed, the cost approximated for such an endeavor was estimated to be \$41 billion. Additionally, it was estimated that the undertaking would require approximately 25 years to complete.

Looking towards the feasibility study the State Corporation Commission (SCC) plans to initiate, it appears the study will mirror the recently undertaken in North Carolina. With such a detailed report before us, it seems unnecessary to duplicate the efforts (which will require tremendous amount of man labor as well as funding), while ignoring a study that so closely replicates the objectives. of the study resolution.

While the SCC must meet the directives contained in House Joint Resolution 153, we respectfully contend that a review of the replies being submitted in response to your July 16, 2004 letter, as well as a thorough review and analysis of the report generated by the North Carolina Public Staff, will provide the SCC with ample information necessary to generate the required report to the 2005 General Assembly.

1. Please identify the major issues/questions that should be addressed by the HJR153 feasibility study.

The most important issue that the feasibility study must address is the costs associated with requiring the burying of distribution utility lines. The study should address the following cost issues:

Construction and Conversion Costs: Engineering designs for overhead and underground utility lines are very different and vary greatly by areas and conditions. Underground line projects require more complex design schematics as well as specialized equipment and material. Additionally, it takes longer to install underground lines than it does to install overhead lines. In order to adequately compare the two methodologies in question, the study must determine the range of costs and labor requirements related to various types of underground versus overhead projects. This comparative analysis must consider both conversion projects as well as residential and commercial development projects. Similarly, the analysis must study cost issues related to both urban and rural settings. Other parameters will also become apparent as various assumptions are designed into the study.

Operation and Maintenance Costs: Equipment used for underground and overhead lines varies. Additionally, linemen require specialized training for underground line maintenance. The study should evaluate the difference in costs of material, labor, equipment and other such parameters.

Another aspect of underground lines needing review is the difficulty in locating problems when there are system failures. Once the problem is located, the actual “fix” is somewhat more complicated than similar problems on overhead lines. The costs associated with typical underground outages, as well as the duration associated with these outages should be compared to similar issues on overhead lines.

Other issues the study should address include:

- **Life expectancy:** Historically, overhead lines have a longer life expectancy than underground lines. The study needs to include a total life cycle cost comparison of overhead vs. underground. The practical life cycle of an underground system may be less than an overhead system, so the inherent higher cost of underground systems should consider this additional cost.
- **Rural vs. Urban Consideration** - The study should consider differences in density to determine when it becomes cost effective to place lines underground (if, in fact, it does become cost effective). The placement of electric facilities underground will always be a more costly than constructing overhead facilities. According, the justification for installing distribution facilities underground must be based upon improvement in service reliability or improvement in aesthetics not because its is the more cost effective alternative.
- **Reliability** – The study should evaluate whether underground lines are truly more reliable during normal circumstances. If not, an assessment should be made as to weather reducing outages during major events is worth the risks of more outages or extended outage durations during typical circumstances. The study should compare reliability of both types of systems during normal operations. The frequency of outages as well as the duration of the outage must be addressed in this comparative analysis.

Also it should be noted that there is more cost and time involved for locating underground facilities in accordance with “Miss Utility”.

What is virtually certain is that the time to repair outages involving underground infrastructure typically requires more time than for comparable overhead facilities, so any reliability gains (possibly fewer outages) stemming from a conversion to an underground system could be at least partially offset by longer restoration times.

- **Funding:** Of paramount importance is the need to evaluate who will pay for the capital cost of converting overhead lines to underground lines. For customer-owned cooperatives, if utilities pay, all the cost will be borne by the consumer. If consumers are responsible for these costs, it should be determined whether all consumers should be required to pay, or only the consumers served by the lines being placed underground. Currently utilities have a rate structure in place that allocates and recovers costs from various rate classes. Typically the rate classes are residential, commercial, commercial and industrial and public authorities. Utilities typically do not have separate tariffs within these customers classes based upon whether service is furnished via an overhead or underground distribution system. Should only underground served customers pay for the conversion work additional complexity in the current filed tariffs may be introduced. Segregation of costs associated with conversion work may be required to develop “underground tariffs”. This segregation of costs may require introducing additional complexity in the current accounting systems employed at each utility.
- **Right-of-way:** The study must look at concerns involving attaining easements for burying lines. Feasibility, length of time and other such issues need to be addressed. . A relevant issue is the consideration of additional width to overhead easements to reduce the likelihood of system damage caused by trees. The underground route of the right-of-way may not be the same circuit route as the current overhead installation. Overhead line routes that currently traverse over wetlands, bodies of water or other difficult terrain may not be suitable for installing an underground system. In such cases a different and possibly longer route may be required for an underground system. This condition will make it very difficult to develop an estimate of costs to underground existing overhead facilities. An average cost per foot to convert existing overhead construction to underground construction without looking at specific circuit routes or terrain will likely result in inaccurate cost estimates.
- **Technology:** The study needs to research if there are any current uses of technology that would be hampered with complete under grounding of the lines.
- **Cost to other Utilities:** Other utilities such as telephone and cable, utilize electric utility poles. These utilities will have to undergo the expense of either, 1) purchasing the poles currently owned by the power companies; 2) installing their own poles; or 3) converting their lines to underground facilities if the electric utilities remove their overhead lines.

- **Implementation Timelines:** What timeframes would the Commission allow for conversion of overhead lines? Would these timeframes be the same for all utilities, or will they vary depending on utility size?
- **Legal Issues:** Various legal issues should be analyzed to ensure the feasibility study is complete. For example, there would be an added tax burden resulting from the increased value of the distribution system. There would also be the need to satisfy existing mortgage holders – many of the existing overhead lines are financed for 25 years or more.

2. Please describe the potential benefits to the public and utility companies associated with the undergrounding of overhead distribution lines.

The most obvious benefit for burying electric utility lines is the potential to reduced risk of “local” outages that are caused by wind and tree damage. Another benefit is improved aesthetics.

3. Please describe the potential negative impacts on the public and utility companies associated with the undergrounding of overhead distribution lines.

It is our belief that burying utility distribution lines would lead to dramatically increased cost for providing service. As provided by one of our member systems, Rappahannock Electric Cooperative, based upon the following current estimates for three types of existing overhead construction, it becomes apparent that underground conversion of nearly 6,500 miles of overhead line would more than double the Cooperative’s rate base. When the embedded original cost installed cost is considered, the rate base may increase 5 or 6 times.

1. Single-phase 1/0 ACSR overhead to 1/0 URD: \$34,681.08 per mile.
2. Three-phase 1/0 ACSR overhead to three-phase 4/0 URD (note that 4/0 URD is equivalent to 1/0 overhead): \$66,362.09.
3. Three-phase average main feeder line 336 MCM ACSR to 750 MCM URD (note that 750 MCM URD is equivalent to 336 MCM ACSR overhead: \$190,367.16.

(Note: The estimated costs quoted above reflect cost information for only one of our member systems. Other member systems have indicated they would have higher estimates.)

Inability to upgrade underground lines without complete replacement would add to this cost. In addition to the added material and labor costs, there would be additional interest expense associated with financing the replacement of existing overhead lines with underground. Furthermore, the need to plan for future capacity additions would increase the cost by having to include empty ducts to accommodate future circuits and/or cable upgrades.

Another consideration should underground lines become a mandate would be the need to develop additional underground construction standards. These new standards include the development of an underground system (duct banks encased in concrete) that would be required to serve load in a downtown urban areas or other areas within a utilities service territory. The determination of costs for such construction standards must also be developed.

Our experience shows the cost of installing new underground construction versus new overhead construction is approximately 3 – 4 times more expensive. The cost increase stems from more complex designs, more expensive materials, and longer installation periods leading to higher labor costs. Additionally, it is difficult to “tap” in to underground lines. Each customer presently served by overhead conductors will be required to convert the service entrance to their structure or property in order to accommodate an underground supply. This leads to increase costs of providing new services.

Compounding the cost issues is the fact that “undergrounding” will not prevent all outages. Service can be lost due to thunderstorms/lightning or equipment failure. Furthermore, under normal circumstances, outages can occur do to water seepage. When these outages occur, restoration time will increase due to the added time required to identify the underground fault, excavate the faulty cable (which will require an emergency call to Miss Utility leading to further delays as repair crews wait for other underground utilities to be located), splice cables, and backfill the excavation. This is a detriment to service reliability.

4. Please describe in detail the potential obstacles associated with the implementation of a program to relocate overhead distribution lines to underground (for example, statutory, regulatory, technological, economic, safety, and physical obstacles).

Economic: By law electric rates are capped until 2010. Would the costs of placing overhead lines underground be included in the definition of “incremental costs for transmission or distribution system reliability and compliance with state or federal environmental laws or regulations to the extent such costs are prudently incurred on and after July 1, 2004” and therefore be recoverable under section 56-582 B of the Code of Virginia?

The economic impact on commercial customers could be significant. Rate increases required to accommodate the conversion of overhead facilities to underground could negatively impact state based companies when competing with companies located in jurisdictions that would not require the placement of electric facilities underground.

Technological: In actual planning for a conversion project to remove overhead and install underground, one must consider the long-term effect from a capacity standpoint. “Undergrounding” would not lend itself to adding additional phases/conductors, without returning to the location and performing the excavations and restorations, unlike upgrading an overhead line. Accordingly, utilities may be required to initially “overbuild” the distribution system in order to avoid significant future costs when capacity or system upgrades are required.

Additional technical issues to consider include studying the effect of requiring underground distribution lines on other utilities, such as telephone and cable companies. The additional costs, reliability issues, etc., of placing their lines underground also need to be considered.

Physical: Utilities have many types of lines, with various capacities for use, in providing service to the consumers over thousands of square miles of territory. These service territories range from mountainous, rocky terrain to sandy, marshland and contain many obstacles that would add substantially to the cost of any conversion. These obstacles include roads, streams, crossings of other utilities, road crossings, easements, and population densities and rocky excavations.

Safety: There will be an increased risk of “dig ins,” both by utility crews and by non-utility excavators, for all utilities as a result of additional excavating while installing or repairing the underground power lines and the increased number of utilities being placed underground. There may be an offset of electric contacts with overhead distribution conductors. Until additional analysis is undertaken, it can not be claimed that the total number of contacts with distribution conductors (whether overhead or underground) would increase or be reduced.

5. Please describe the process for identifying and securing right-of-way easements for the relocation of existing overhead distribution lines to underground. What property rights issues would be raised as a result?

While a few overhead easements may contain provisions to allow the installation of underground facilities, many overhead easements do not contain such provisions, resulting the requirement to approach and obtain easements from thousands of individual landowners, a costly and time-consuming process. Each owner would be contacted and required to sign an easement and a sketch showing the location of the proposed underground facilities. These need to be notarized and recorded with the local courts. Would courts apply eminent domain to force a land owner from whom easements are unattainable (for example, if the owner refuses to sign, cannot be located, or the land is owned by an estate involving multiple parties) even though overhead lines already transverse the property?

In addition, many public rights of way currently crossed with overhead facilities will require new underground permits (i.e., VDOT road crossing permits). The process of preparing and processing applications and paying fees will further add to the time and cost.

6. In order of importance, list the criteria that should be considered to determine whether the implementation of a program to relocate overhead distribution lines to underground is desirable.

The cost of requiring conversion of overhead lines to underground lines as compared to the benefits derived from such a conversion should be the first criteria considered prior to implementing this program.

Identifying and securing the funding for these conversions.

Effects on service reliability must also be a criteria evaluated as part of the study.

Potential legal issues need addressing.

Effects of implementing this program on other utilities and future technologies must be considered.

- 7. In order of preference, describe the potential options for funding the relocation of overhead distribution lines to underground and explain the basis of your recommendation.**

Paid by the government entity requiring the placement of lines underground. If the government determines underground lines serve the public interest better than overhead, the government should bear the burden of paying for the increased costs.

Paid by existing consumers who receive the benefit.

Significant rate increase – for cooperatives, the only other option is to reduce member equity, which would negatively affect mortgage agreements and TIER requirements.

- 8. Should one or more pilot programs be conducted to determine more precisely the benefits, costs and obstacles associated with the implementation of a program to relocate overhead distribution lines to underground? If pilot programs should be conducted, how could and should the pilot programs be funded?**

No, the effectiveness of a pilot program could not be determined at least until there was another hurricane or ice storm. A major storm may not occur during the pilot program. In addition, the cost of maintenance and, ultimately, replacement of the underground facilities will not be known for many years so an expectedly short pilot program would have no value. The criteria to determine the effectiveness of any program must be developed before the program initiated. Weathering a major storm or hurricane without outages is only one measure for determining success or failure. A much broader view should be taken where multiple criteria are developed.

Instead, perhaps more accurate estimates of conversion costs would be determined during a rigorous study of the conversion issues – a study that could be authorized and funded by the General Assembly through the State Corporation Commission.

- 9. Considering the legal costs, benefits and obstacles associated with the implementation of an undergrounding program, should the General Assembly require utilities to place all or a portion of existing and/or new overhead distribution lines underground? Alternatively, should such decisions be left to local government? Please explain your answer.**

Considering all costs, benefits and obstacles associated with the implementation of an undergrounding program, the General Assembly should not require utilities to place overhead distribution lines underground. Given estimates that indicate rates may easily be doubled as

result of a conversion, legal issues involving property rights, and issues involving service reliability, converting overhead to underground distribution systems would be a detriment to the Cooperative's customer-owners.

Additionally, our member cooperatives have service territories that cover a wide area and many different localities. Allowing local governments to make the decision regarding undergrounding would also prove detrimental to the Cooperative. With a multitude of local entities in question, there is the possibility of multiple decisions. This would make system design difficult and non-universal.

In some more suburban areas, codes governing residential and commercial development require underground construction, with the cost differential for underground construction paid by the developer or builder. In some of those areas, approximately ninety percent of all new electrical distribution construction is underground, so for those service territories there is a reasonable expectation that system damage due to severe weather will improve over time without any conversion of existing facilities.

Furthermore, if only a small number of localities implement undergrounding, the cost will be shared by all of the Cooperative's customers. It is not fair for customers to pay for this work if it is not being done in their locality (rate-making is currently based on system-wide average costs; to be fair to consumers, rates would need to be different in localities requiring the use of underground lines).

10. What obstacles, if any, currently prevent a local government from enacting an ordinance establishing all or part of the locality as an area in which: (a) existing overhead utility distribution lines must be relocated underground over some period of time; and/or (b) all new utility distribution lines must be located underground?

If only a small number of localities implement undergrounding, the cost will be shared by all of the Cooperative's customers. It is not fair for customers to pay for this work if it is not being done in their locality (rate-making is currently based on system-wide average costs; to be fair to consumers, rates would need to be different in localities requiring the use of underground lines).

11. For the specific purpose of funding the undergrounding of existing overhead utility distribution lines, what obstacle, if any, currently prevent a local government from levying a special tax on the residents and businesses of an area within the locality in which the local government has enacted an ordinance requiring the undergrounding of utility distribution lines? Would such a special tax assessment require specific new authorization from the General Assembly?

No comment at this time.

12. Interested parties are invited also to address all other legal and policy issues they believe relevant to this investigation.

No comment at this time.

13. Please indicate below your desired level of participation in the feasibility study.

Placed on the distribution list for all correspondence.

Name: Salud Layton

Field of expertise: Government Affairs Coordinator

Organization: Virginia, Maryland, Delaware Association of Electric Cooperative

Address: P.O. Box 2340
Glen Allen, VA 23058-2340

E-Mail: Slayton@odec.com

Phone: (804)240-8755

Fax: (804)346-3448

Considered as an active participant in the feasibility study. If you wish to be considered as an active participant, please complete the following:

Name: Steve Atkinson

Field of expertise: transmission and distribution energy delivery

Organization: Northern Virginia Electric Cooperative

14. If you are interested in participating as an active participant, would you be willing to serve also as a member of a subgroup to identify, research, and analyze specific issues and provide written summaries of specific topics of study?

Yes (Mr. Atkinson is willing to be an active participant)

15. Please provide the following information:

Name: Steve Atkinson

Title: System Engineering and Planning

Mailing Address: 5399 Wellington Road
Gainesville, VA 20155

Telephone 703-754-6773

Fax

Email Address satkinson@novec.com

16. Do you plan on attending the kickoff meeting in Richmond (specific location to be announced later) scheduled for 9:30 a.m., Monday, August 16, 2004?

Yes.

Number attendees representing your organization: Approximately six of our members from various electric cooperatives plan to attend the meeting August 16, 2004.

Again, we would remind the Staff of the North Carolina investigation and report and reference the conclusion of said report, which we feel would be the exact same conclusions that will be reached in the event Virginia decides to duplicate this effort.